

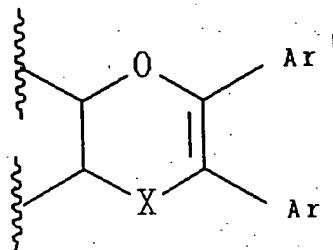
What is Claimed Is:

1. A composition comprising:

(a) a metal chelate comprising a metal selected from the group consisting of europium, terbium, dysprosium, samarium, osmium and ruthenium in at least a hexacoordinated state and

10 (b) a compound having a structural portion that is a double bond substituted with two aryl groups, wherein one of the aryl groups is electron donating with respect to the other, an oxygen atom and an atom selected from the group consisting of oxygen, sulfur and nitrogen.

15 2. The composition of Claim 1 wherein said compound
has the structural portion:



(7)

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wherein X is O, S or N wherein the valency of N is completed with hydrogen or an organic radical consisting of atoms selected from the group consisting of C, O, N, S, and P and Ar and Ar' are independently aryl wherein one of Ar or Ar' is electron donating with respect to the other.

3. A composition comprising a latex particulate material having incorporated therein the composition of Claim 1.

5 4. The composition of Claim 1 wherein Ar is selected from the group consisting of 5-member and 6-member aromatic and heteroaromatic rings.

10 5. The composition of Claim 1 wherein Ar is phenyl substituted with an electron donating group at a position of the phenyl that is meta or para to the carbon that is bonded to the double bond and Ar' is phenyl.

15 6. A method for determining an analyte which comprises:

20 (a) providing in combination (1) a medium suspected of containing an analyte, (2) a photosensitizer capable in its excited state of activating oxygen to a singlet state, said photosensitizer associated with a specific binding pair (sbp) member, and (3) the composition of Claim 3 wherein said particulate material has bound thereto an sbp member,

(b) treating said combination with light to excite said photosensitizer, and

25 (c) examining said combination for the amount of luminescence emitted therefrom, the amount of said luminescence being related to the amount of analyte in said medium.

30 7. A kit comprising in packaged combination:

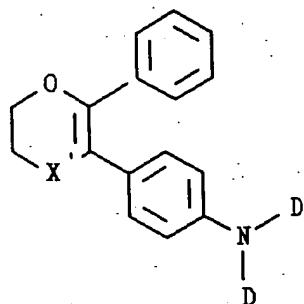
(a) the composition of Claim 3 and

(b) a photosensitizer that is not in said composition and is capable in its excited state of activating oxygen to its singlet state.

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8. The composition of Claim 1 wherein said compound is:

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(1)

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wherein X' is S or NR' wherein R' is alkyl or aryl, and D and D' are independently selected from the group consisting of alkyl and alkyl radical.

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9. The composition of Claim 8 wherein D and D' are methyl.

10. The composition of Claim 8 wherein R' is lower alkyl.

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11. The composition of Claim 8 wherein X' is S and D and D' are alkyl.

12. The composition of Claim 8 wherein X' is N(CH₃) and D and D' are alkyl.

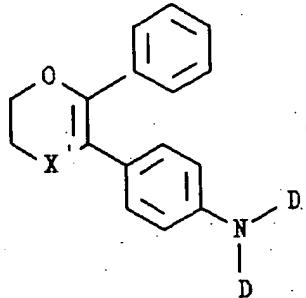
13. A composition comprising:

5 (a) a metal chelate comprising a metal selected from the group consisting of europium, terbium, dysprosium, samarium, osmium and ruthenium in at least a hexacoordinated state and

(b) the compound of Claim 8.

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14. A compound of the formula:



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(1)

wherein X' is S or NR' wherein R' is alkyl or aryl and D and D' are independently selected from the group consisting of alkyl and alkyl radical.

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15. The compound of Claim 14 wherein R' is methyl or phenyl.

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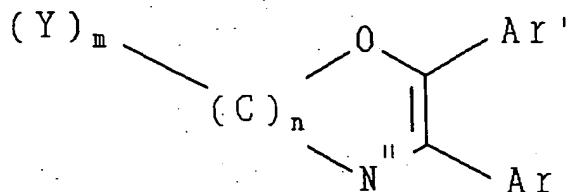
16. A composition comprising:

(a) a metal chelate comprising a metal selected from the group consisting of europium, terbium, dysprosium,

samarium, osmium and ruthenium in at least a hexacoordinated state and

(b) the compound of Claim 14.

5 17. A composition comprising a latex having incorporated therein a compound of the formula:



15 wherein X'' is O, S or NR'' wherein R'' is alkyl or aryl, n is 1 to 4, and Ar and Ar' are independently aryl wherein one of Ar or Ar' is electron donating with respect to the other and Y is hydrogen or an organic radical consisting of atoms selected from the group consisting of C, O, N, S, and P and m is 0 to 2.

20 25 18. The composition of Claim 17 wherein R'' is methyl or phenyl.

30 19. The composition of Claim 17 wherein n is 2.

20. The composition of Claim 17 wherein Ar is selected from the group consisting of 5-member and 6-member aromatic and heteroaromatic rings.

21. The composition of Claim 17 wherein Ar is phenyl substituted with an electron donating group at a position of the phenyl that is meta or para to the carbon that is bonded to the double bond and Ar' is phenyl.

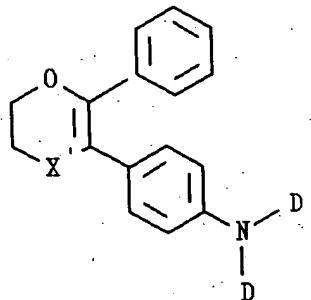
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22. The composition of Claim 17 comprising a metal chelate wherein said metal is selected from the group consisting of europium, terbium, dysprosium, samarium, osmium and ruthenium in at least a hexacoordinated state.

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23. A composition comprising a latex having incorporated therein a compound of the formula:

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(1)

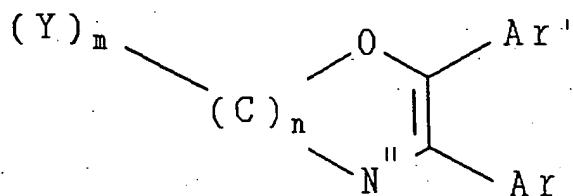
25. wherein X' is S or NR' wherein R' is alkyl or aryl and D and D' are independently selected from the group consisting of alkyl and alkyl radical.

30. 24. The compound of Claim 23 wherein R' is methyl or phenyl.

25. A method for determining an analyte which comprises:

(a) providing in combination (1) a medium suspected of containing an analyte, (2) a photosensitizer capable in its excited state of activating oxygen to a singlet state, said photosensitizer associated with a specific binding pair (sbp) member, and (3) a suspendible latex particulate material comprising a chemiluminescent compound, said particulate material having bound thereto an sbp member, said chemiluminescent compound having the formula:

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(2)

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wherein X'' is O, S or NR'' wherein R'' is alkyl or aryl, n is 1 to 4, and Ar and Ar' are independently aryl wherein one of Ar or Ar' is electron donating with respect to the other and Y is hydrogen or an organic radical consisting of atoms selected from the group consisting of C, O, N, S, and P and m is 0 to 2,

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(b) treating said combination with light to excite said photosensitizer, and

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(c) examining said combination for the amount of luminescence emitted therefrom, the amount of said luminescence being related to the amount of analyte in said medium.

26. The method of Claim 25 wherein said photosensitizer is incorporated in a second suspendible particulate material.

5 27. The method of Claim 25 wherein R'' is methyl or phenyl.

10 28. The method of Claim 25 wherein n is 2 and Ar is selected from the group consisting of 5-member and 6-member aromatic and heteroaromatic rings.

15 29. The method of Claim 25 wherein Ar is phenyl substituted with an electron donating group at a position of the phenyl that is meta or para to the carbon that is bonded to the double bond and Ar' is phenyl.

20 30. The method of Claim 25 wherein said photosensitizer is a dye capable in the excited state of activating molecular oxygen to singlet oxygen.

25 31. The method of Claim 30 wherein said dye is selected from the group consisting of methylene blue, rose bengal, porphyrins, and phthalocyanines.

30 32. The method of Claim 25 wherein said sbp members are independently selected from the group consisting of receptors, ligands, and polynucleotides.

35 33. The method of Claim 25 wherein said analyte is selected from the group consisting of drugs, proteins, nucleic acids and microorganisms.

34. The method of Claim 25 wherein said method is a homogenous immunoassay.

5 35. The method of Claim 25 wherein said combination

is treated by irradiation to excite said photosensitizer.

36. The method of Claim 25 wherein said combination
is irradiated with light having a wavelength of 450-950 nm.

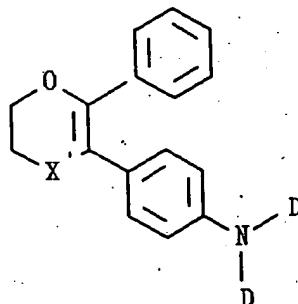
10 37. The method of Claim 25 wherein said sbp member
associated with said photosensitizer is avidin or an
antibody and said sbp member of said chemiluminescent
compound is avidin or an antibody.

15 38. The method of Claim 25 wherein said particulate
material comprises a metal chelate comprising a metal
selected from the group consisting of europium, terbium,
dysprosium, samarium, osmium and ruthenium.

20 39. A method for determining an analyte which
comprises:

25 (a) providing in combination (1) a medium
suspected of containing an analyte, (2) a photosensitizer
capable in its excited state of activating oxygen to a
singlet state, said photosensitizer associated with a
specific binding pair (sbp) member, and (3) a suspendible
latex particulate material comprising a chemiluminescent
compound, said particulate material having bound thereto an
sbp member, said chemiluminescent compound having the
30 formula:

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(1)

wherein X' is S or NR' wherein R' is alkyl or aryl and D

and D' are independently selected from the group consisting

15 of alkyl and alkyl radical.

(b) treating said combination with light to excite said photosensitizer, and

(c) examining said combination for the amount of luminescence emitted therefrom, the amount of said 20 luminescence being related to the amount of analyte in said medium.

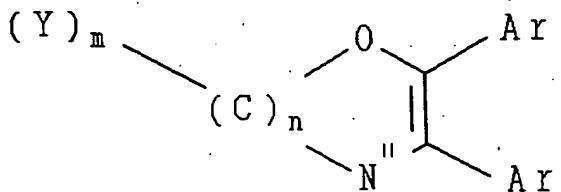
40. The method of Claim 39 wherein R' is methyl or phenyl.

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41. The method of Claim 39 wherein said particulate material comprises a metal chelate comprising a metal selected from the group consisting of europium, terbium, dysprosium, samarium, osmium and ruthenium in at least a 30 hexacoordinated state.

42. A kit comprising in packaged combination: (1) a composition comprising a suspendible latex particle comprising a chemiluminescent compound of the formula:

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10 (2)

15 wherein X'' is O, S or NR'' wherein R'' is alkyl or aryl, n is 1 to 4, and Ar and Ar' are independently aryl wherein one of Ar or Ar' is electron donating with respect to the other and Y is hydrogen or an organic radical consisting of atoms selected from the group consisting of C, O, N, S, and P and m is 0 to 2, said particle having bound thereto a specific binding pair (sbp) member, and (2) a photosensitizer capable in its excited state of activating oxygen to its singlet state.

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25 43. The kit of Claim 42 comprising a composition comprising a second suspendible particle comprising said photosensitizer, said second particle having bound thereto a sbp member.

30 44. The method of Claim 42 wherein said particulate material comprises a metal chelate comprising a metal selected from the group consisting of europium, terbium, dysprosium, samarium, osmium and ruthenium.